CQIP

Centre québécois
pour l'informatisation
de la production

A Network for the Future

87-05670/

The CQIP

Background

The last recession confronted the Quebec manufacturing industry with the fact that there are new "rules of the game" in several vital sectors of our economy. This turn of events calls for change that, far from being uniform and universally applicable, has many aspects which, if carried out in concert, can ensure sustained economic growth over the medium and long term.

Economists are agreed that over 40% of economic growth can be attributed to the use of leading-edge technology in the production of goods and services. Labour and capital account for a slightly smaller proportion, and economies of scale and a better organization of the agricultural sector for the balance. The obvious conclusion, but one that manufacturing firms are reluctant to come to, is that the manufacturing sector must acquire better technology.

The technology in question consists especially of drafting, design, manufacturing, handling and production-management tools which harness the power of the computer. The use of these tools in manufacturing is referred to as **computer integrated manufacturing (CIM)** or, in some quarters, "productics".

The use of high technology requires technical expertise, opportunities for professional training and a financial capacity that the vast majority of small – and medium-sized manufacturing firms in Quebec do not have. The fact that most CIM tools have appeared only fairly recently in Quebec explains why the expertise associated with these tools is still not very widespread. Without assistance, leading-edge technology in the small – and medium-sized business sector may remain nothing more than a dream forever.

The impact of this situation on the economic equilibrium of our society prompted the Government of Quebec to create the **Centre québécois pour l'informatisation de la production (CQIP)**, a non-profit corporation under the direct responsibility of the Minister of Higher Education and Science designed to promote the computerization of production.

Mandate

The CQIP is responsible for:

- Creating a favourable environment for the introduction of CIM in all Quebec manufacturing firms.
- Developing CIM technologies.
- Promoting CIM in all areas liable to benefit from it.
- Identifying the various pockets of CIM expertise in Quebec (firms which have already adopted CIM, private or government research centres, labour, specialized consultants, manufacturers of data-processing and productics equipment, various economic development officers and, especially, the tremendous resources of the world of higher education).
- Bringing them toghether in CIM laboratories.
- Operating these laboratories as a pan-Quebec network.
- Furnishing the laboratories with data-processing equipment dedicated to manufacturing.

Following careful study, the CQIP's board of directors set as its major objective *to promote the integration of new CIM technologies and the progessive automation of production processes in all Quebec manufacturing firms*. A list of the industrial sectors requiring priority action was established and five means of intervention, or "missions", were decided upon for assisting the firms in these sectors.

- Circulation of information relating to CIM
- Demonstration of CIM technologies
- Technical development and experimentation relating to CIM
- Consultation services for manufacturing companies (in collaboration with recognized firms in this field)
- Training of technical staff

Operation

The scope of the CQIP's mandate makes any attempt to operate in isolation inappropriate. According to the plan it has chosen for the accomplishment of these missions, the CPIQ acts as a catalyst drawing on the best human and material resources available in our institutions of higher education, businesses, private and government research centres, and among the many economic development officers, specialized consultants, and manufacturers of data-processing and productics equipment.

The CQIP's missions are carried out in the CIM laboratories and specialized units which were officially created on March 24, 1986. Each laboratory as well as the specialized unit is dedicated to a specific industrial sector and located in a region where there are recognized skills in that sector. A powerful data-processing network links the laboratories to each other and enables each, in addition to serving its industrial sector as a whole, to interact efficiently with different types of firms located in its immediate environment.

The concept of partnership within CIM laboratories is an important step toward the abolition of the traditional boundaries between research, education and manufacturing production. It enables us to reverse the trend toward isolated activity that held sway during the years of prosperity and to reach new heights of efficiency through the pooling of ideas and experiences.

President's report

Establishment of CQIP structure

For the past several years the manufacturing industry has been undergoing a period of profound upheaval, the repercussions of which affect all sectors of activity in our society. The dramatic progress of technology has given rise to new ways of designing and manufacturing all sorts of objects and products, to the point where specialists now refer to the transformation in the way work is performed in the manufacturing sector as the new industrial revolution.

New tools are changing all the standards of power, efficiency, performance and quality until now associated with manufacturing production in Quebec. These are drafting, design, manufacturing, handling and production-management tools that benefit from the capacity of the computer in an industrial setting. The imperative need for high technology in manufacturing is not illusory. To ignore it would amount to denying the interaction of phenomana such as the development of communications, the increase in international competition and the tendency to relax the rules governing international trade-phenomena which, when combined with many imponderable factors such as fluctuations in the money market, can precipitate the decline of currently viable firms. To do our best is no longer enough: we must do even better!

Aware of the situation, the Government of Quebec established the Centre Québécois pour l'informatisation de la production (CQIP), a centre for the computerization of production. The CQIP's mandate is to create a favourable environment for the transfer of existing high technology from our institutions of higher education, research centres and large firms to small- and medium-sized manufacturing firms. Of course, the promotion of technology did not begin with the CQIP. But the CQIP is an innovative agency in that it carries out its mandate while subordinating technological change to human resources, which are central to all its activities and the most precious capital of any firm.

The CQIP's objective for 1985-86 was to set up its administrative and technical structure. The Operational Centre became fully staffed with the arrival of specialists in management, administration and various technical fields.

This team's task was to develop a model that would bring together pockets of expertise in computer integrated manufacturing within the CQIP's laboratories, and to set up the necessary data-processing systems to carry out the Centre's mandate.

Today, more than fifty representatives from our institutions of higher education, the private sector, private and government research centres, labour and economic development agencies as well as specialized consultants have agreed to meet the challenge of concerted action **concretely** by unifying their activities within CQIP laboratories.

Thanks to a relentless effort, what everyone had long wished for finally came about: the technological expertise of the worlds of higher education, research and business were integrated so as to become more easily accessible to the Quebec manufacturing industry as a whole.

CQIP laboratories and network

The integration of technological expertise does not mean its monopolization or concentration in only one location. The CQIP's structure was designed so as to promote the potential and technological expertise of the various regions of Quebec. In its first phase, the CQIP network therefore includes six regional laboratories and one specialized unit, each serving an entire industrial sector.

Accordingly, each laboratory as well as the specialized unit is faced with the challenge of developing state-of-the-art expertise in its area of specialization. To accomplish this, it calls upon the knowledge of the CQIP's partners in its region and acts as a network of multidisciplinary experts. A powerful data-processing system enables information to be exchanged instantaneously between specialists in various fields stationed in the different laboratories. Each CQIP laboratory is therefore in a position to offer services not only in its own area of specialization but also in the other sectors of industrial activity in its immediate environment.

The missions of the CQIP network

The creation of a favourable environment or *climate* for the introduction of CIM in our firms must necessarily take the human factor into account. Technology offers us virtually unlimited possibilities and the literature on the subject tells us that where its has been successfully introduced, the workers concerned were involved from the very start.

This first year of operation enabled us to establish five basic missions focussing on the demystification, knowledge and utilization of CIM. These missions are aimed primarily at those persons who must make the necessary effort at adaptation so that technology transfer in firms can succeed.

At the end of this first year, the CQIP and its partners have achieved what many thought impossible: they have brought together the acme of Quebec's technological expertise within a network dedicated to increasing the ability of our small- and medium-sized firms to compete technologically. Much remains to be done, but we now have better tools with which to do it.

The future looks promising indeed following this initial setting-up phase. No less than four new laboratories, each with its own sector of activity, will see the light of day during the summer of '86. They will complement the work of the existing laboratories in the CQIP network by focussing on metal products, plastics, applied mechanics in the field of oceanography and the development of numerically-controlled tools: areas in which prospects for the development of state-of-the-art expertise are particularly bright.

Through the pooling of ideas and efforts, we have succeeded in implementing an original concept that is well adapted to the context and need for technological development of the eighties and nineties. The unanimity surrounding the CQIP and its operation gives us high hopes for the future of our manufacturing firms.

Roland A. Dugré, *eng.*

Major Facilities

Twelve CIM laboratories linked together by a powerfull computerized network allow **CQIP** to fulfil its missions.

1 Electromechanics

This laboratory is dedicated to demonstrate how CIM technologies can greatly improve the productivity and profitability of firms involved in manufacturing and servicing mechanical and electrical equipment, a most dynamic sector of our economy.

Cegep St-Jean-sur-Richelieu
Commission Scolaire Honoré-Mercier
St-Jean Royal Military College
Conseil Économique Haut-Richelieu
Commissariat Industriel Montérégien
Conseil Economique Chambly
Chambre de Commerce du Haut-Richelieu
Canadian Manufacturers Association

2 Processes Control

Automation of industrial production is made easier by the possibility of adding computerized controllers and other devices to existing tools. The processes control laboratory is aimed at the modernization of production equipment with the help of programmable controllers and micro computers.

Cegep de Jonquière
(Centre de Production Automatisée)
Université du Québec à Chicoutimi
(Applied Sciences Department)
Cegep de Sherbrooke.

3 Transportation Equipment

This laboratory is dedicated to help this particular industry getting access to the latest technology now used by its continental and international customers. It is oriented toward implementation of automated technology in the small manufacturing firms sub-contracting for larger ones in the field of transportation (cars, aircrafts, trains, subways, etc...)

École de Technologie Supérieure
Bombardier Inc.
General Motors of Canada Ltd.
Hewlett Packard (Canada) Ltd.
Pratt & Whitney Canada Ltd.
Cegep Edouard-Montpetit
Cegep St-Laurent
Cegep Vanier
École Polytechnique
Université du Québec à Montréal
(Administration Sciences)

4 Furniture, Accessories and Carved Wood

Quebec is world-famous for the quality of its furniture industry. High technology allows manufacturers to even improve their designs and to quickly respond to any change required for particular applications dictated by specific needs or fashions. Technology also improves security and motivation of work force as it does away with hazardous or repetitive tasks.

Cegep de Victoriaville

Association des Fabricants de Meubles du Québec Inc.

Association Provinciale de l'Industrie du Bois Ouvré du Québec Inc.

Centre Québécois de Productivité du Meuble et du Bois Ouvré

5 Clothing

Clothing offers tremendous possibilities for computer based technologies. The clothing laboratory shows how to take advantage of these to open new perspectives in fashion design, creation, color coordination, and in the factory automation for the clothing industry.

Collège Lasalle

École de Technologie Supérieure

Centre Québécois de Productivité du Vêtement

Institut des Manufacturiers du Vêtement du Québec Inc.

Centre Spécialisé de la Mode du Québec

Créations KTM Inc.
Hewlett Packard (Canada) Ltée

Katescorp. Inc.

Fossettes de Poupée

Imperial Converters Co. Ltd.

Canadelle Inc.

6 Mechanical Products

Mechanical products play a key role in each and every sector of our economy. In fact, their abundance make the mechanical products laboratory a major crossroads of the **CQIP** network.

Université Laval

Cegep de La Pocatière

Cegep de Lévis-Lauzon

Cegep de Limoilou

Centre de Recherche Industrielle du Québec – Ste-Foy

Industries IVI Inc.

Lyster Ltd.

Société Inter-Port de Québec

Chambre de Commerce de la Rive-Sud de Québec

7 Textile

Textile industry came up against numerous difficulties in the last decade and was badly hurt. High technology is the key to a renewed industrial strategy for this particular sector. Experts in the textile laboratory know how to improve productivity and profitability in order to restore a capacity for Québec firms to compete on international markets.

Le Centre de Productivité du Textile, Protextile

Université de Sherbrooke

Cegep de St-Hyacinthe

8 Mechanics-Oceanography

The unique expertise developed in Rimouski with respect to technologies related to the sea, makes this area a natural location for a laboratory dedicated to products used in oceanography. The impressive number of small and medium-sized firms already active in the sector of mechanical products manufacturing allowed CQIP to combine both fields and establish the mechanics-ocenography laboratory.

Cegep de Rimouski

Université du Québec à Rimouski

Conseil Economique de Rimouski Inc.

9 Plastics

Plastic and composite materials offer unlimited perspectives for new applications. Quebec must not only take part in this revolution but also be a trendsetter.

Ecole Polytechnique

McGill University

Cegep Ahuntsic

Cegep de St-Jérôme

Plastiques Industriels, Division du Groupe Hamelin Inc.

Industrie Provinciale Limitée (IPL)

Institut de Génie des Matériaux

Cegep Région de l'Amiante.

10 Simulation and Artificial Intelligence

Process simulation and artificial intelligence are most valuable tools for numerous industrial activities. These "avant-garde" techniques can be the key to the solution of important problems regarding planning of technological changes and their impact on operations and profitability.

Moreover, Quebec is world-renowned for its expertise related to simulation and artificial intelligence. CQIP thus created a special unit appointed to achieve technological transfer from universities and research centers to industries which are liable to benefit from simulation and artificial intelligence technologies.

CQIP Centre Opérationnel
École Polytechnique
Haute Technologie Appliquée Liée
Institut d'ordinique du Québec
Université du Québec à Trois-Rivières
McGill University

11 Metal Products

Quebec is extremely active in the primary metal sector and sheet-metal industry. However, it must be acknowledged that the procedures used by many small and medium-sized firms in this sector limit the competitive capacity of the Quebec metal rolling, casting and extruding industry. The considerable added value generated by these transformation procedures points to the advisability of using high technology, which is an indispensable instrument for maintaining our traditional markets and conquering new ones.

12 CAD / CAM and NC Link

The power of CAD / CAM systems is often limited by the ability to "communicate" between their different components. Proper links are vital to fully benefit from these tools. **CQIP** knows this problem is a major industrial concern and has a special unit working on proper solutions.

Cegep John Abbott

ICAM

Concordia University

Associated Organisms

Because CQIP cannot have a laboratory dedicated to each and every industrial activity which can benefit from high technology, close ties were developed with existing organizations known for their highly valuable expertise with respect to particular activities or applications of high technology. These partners are known as "Associated Organisms". They are:

Centre de Recherche Minérale du Québec
Centre de Recherche en Foresterie du CEGEP de Sainte-Foy
Centre spécialisé en bureautique et en gestion de l'information du CEGEP Bois-de-Boulogne
Consortium of consultants Pamotech
CAD/CAM Association

Personnel (at CAIP Operational Center in Montréal)

Mr. Roland A. Dugré, Eng., President and Chief Executive Officer

Mr. Gaston Beaulieu, Eng., Technical Director,

Mr. André St-Onge, Administrative Director,

and 11 employees specialized in technical, administrative and communication matters.

Provincial government contributions

Areas of Expertise and Specialization

2D CAD
3D WIREFRAME CAD
3D SURFACES CAD
3D SOLIDS CAD
MECHANICAL CAD
ELECTRONIC CAD
AEC CAD
MAPPING CAD
MECHANICAL CAM
ELECTRONIC CAM
MECHANICAL ANALYSIS OR SIMULATION
NC PROGRAMMING, CNC, DNC
CAD DATABASE DESIGN
AUTOMATED MATERIAL HANDLING
AUTOMATED TESTING
COMPUTER-ASSISTED PROCESS PLANNING
ROBOTICS
ARTIFICIAL INTELLIGENCE
ROBOTIC MATERIAL HANDLING
OFF-LINE ROBOT PROGRAMMING

Software of Greatest Experience

Simulation of automated systems and processes in the following fields of activities:

mechanical parts and machinery
metal products
material handling
electric and electronic equipment
clothing and shoes
furniture and carved wood
plastics and rubbers

Services Offered

Diffusion of informations about automation and high technology
Software and equipment demonstrations
Technical development and experimental testing
Technical consulting for the industry
Education and personnel training for manufacturing firms
Automation plan development
Technical seminars

Research and Development conducted at Center

Adaptation and development of process analysis methods and manufacturing equipment.
Development, adaptation and testing of CAD / CAM systems and robotics.
Development of methodologies and rules for implementation of automation systems.

CQIP Network

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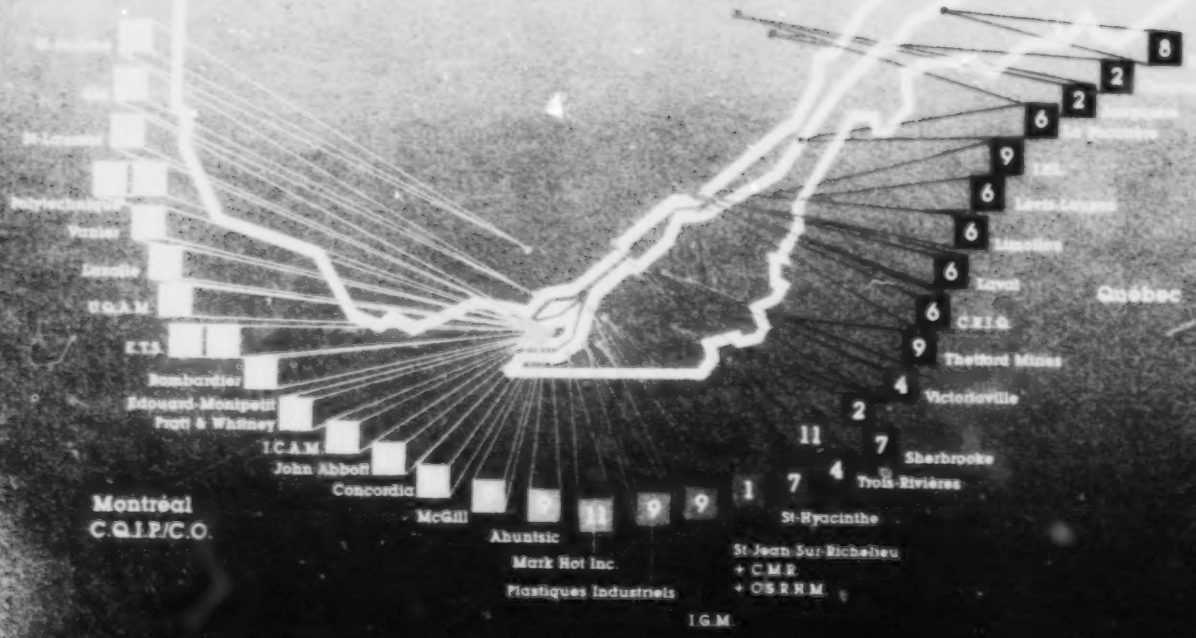

- CQIP / Electromechanics
- CQIP / Processes control
- CQIP / Transportation equipment
- CQIP / Furnitures, accessories and carved wood
- CQIP / Clothing
- CQIP / Mechanical products
- 7 CQIP / Textile
- 8 CQIP / Mechanics-oceanography
- 9 CQIP / Plastics
- 11 CQIP / Metal products
- 12 CQIP / CAD CAM and NC Link